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COLLABORATIVE ON-FARM RESEARCH FOR DECISION SUPPORT: ACTIVITIES OF A PILOT GROUP ON THE DARLING DOWNS

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SUMMARY

Collaborative on-farm research is distinguished from research 'on-farm'. Researchers, extension coordinators and farmers are working together in a research project aimed at improving management of resources in crop production systems on the Darling Downs in southern Queensland. Activities of the pilot group have included: regular meetings for planning and reflection on progress; the visit of a pedologist to the farms; demonstration of soil coring to improve knowledge of soil properties at the paddock level; and the comparison of decisions based on a simulation model of opportunity cropping with a farmer's decisions, over 30 years.

KEYWORDS

Collaboration; on-farm research; decision support; opportunity cropping.

INTRODUCTION

Applied research - *obtaining information to help resolve a particular problem* (Andrew and Hildebrand, 1982) - has been done previously on-farm. Usually, this has meant little more than the location of researcher-designed researcher-managed trials in a commercial paddock. The collaboration of researchers in on-farm research, largely designed and managed by farmers, is a recognised method in the Third World (Amanor, 1990). This approach is relatively novel in Australia.

Researchers from the Agricultural Production Systems Research Unit (APSRU) are collaborating with the facilitator and one nominated farmer from each of three extension groups. The principal activity is the conduct of on-farm experiments with summer and winter crops on the Darling Downs in south-east Queensland. This initiative will help to identify key components of technology and knowledge that could contribute to improved management. Similar collaborative on-farm research in Central Queensland is described by Cox et al. (1993).

On the Darling Downs, we are trying to make full use of the large number of pre-existing farmer groups to identify problems that can be tackled using on-farm experiments. The project involves a farmer and an extension coordinator from each of three established groups, and six researchers from APSRU.

On-farm research has three important characteristics: doing experiments on-farm rather than on a research station, to force relevance through recognition of the constraints under which commercial agricultural production has to operate; working with networks of farmers , which fosters wider ownership of the investigation; and the use of models, which allows generalisation of experimental results spatially and temporally. It recognises the more general need to consider relevance, process and formality in the design of any system intervention (Ledington, 1992).

We are trying to design a group process to facilitate the management of technical and conceptual change at farm level. This paper explores the way in which a novel configuration of existing diverse groups.

DEVELOPMENT OF THE PILOT ON-FARM RESEARCH GROUP

On-farm research was initiated in October 1992 by APSRU scientists in collaboration with four innovative farmers who were active in three "extension" groups. The collaborating groups are: Maximum Efficient Yield (MEY - which seeks to raise grain protein content in wheat; the Conservation Farming Information Centre (CFIC - which promotes new technology, especially conservation tillage: and a local Catchment Management group supported by the Land Conservation Division of the Queensland Department of Primary Industries.

The coordinator of each group was invited to enter into a collaborative project with APSRU that would concentrate on both the water use and response to nitrogen fertilizer of summer and winter crops. The coordinators each nominated a farmer who was already conducting experiments and who would welcome a working link with APSRU. An expanded range of fertiliser rates was negotiated and value was added to each farmer's experiment by measuring soil water and nitrogen, and plant production at selected times.

JOINT ACTIVITIES OF THE GROUP

1. *Formation of the pilot group*
The group meets at intervals of a few months to discuss results and experience. All participants learn through interaction during the analysis and interpretation of results.

2. *Visit by a soil expert*
A pedologist explained how soil develops in response to landscape, geology and erosion processes. He underlined the relation between different soil types across a landscape, and explained the factors that affect texture, depth, water storage and fertility. Awareness was raised of the incidence of soil gradients across a farm or field that may greatly influence crop establishment, water capture and storage from rainfall, and the supply of nutrients to a crop.

3. *Use of soil coring techniques on the farm*
Farmers rarely have the opportunity to see and feel the soil, except at the surface. A simple coring tube was demonstrated, driven into the soil by either a vehicle-mounted hydraulic device or by hand with a large wooden hammer. Group members were able to feel the changes in strength along the soil core, which indicate change in water content and to see the changes of colour and texture with depth as well as the distribution of roots. The farmers indicated that this closer acquaintance with the soil would enable them to make better management decisions.

4. *Testing crop simulation models*
A key research technology developed within APSRU is the Agricultural Production Systems SIMulator (APSIM). This brings greater flexibility and rigour to the simulation of the performance of individual crops within the farming system (Hammer et al., 1993). Crop modules from APSIM can be used in an on-farm study: to assist in the interpretation of results where statistical models are inappropriate; to enable fine- tuning of the model so that current results can be generalised; and to ask "what if?" questions about alternative management actions.

Wheat and sorghum modules were tested against 30 years of farm records of crop yield and daily rainfall. The output from the wheat model, using automatic planting rules (which base the decision to plant on a minimum amount of rainfall within a set period) corresponded closely with the farmer's experience. The sorghum model failed to predict the effect of sporadic heat stress at flowering on final yield so has been modified accordingly.

DISCUSSION

The pilot group recognises the value of farmers' own experimental programs, and helps with monitoring and interpretation. The more intensive measurements of on-farm test strips adds to their value as a guide for improved management. The experience of working in the real world adds greatly to the confidence of scientists in the applicability of outcomes.

A novel aspect of this work is the application of 'research into research'. Reflection by the pilot group, after each activity, seeks to identify the strengths and weaknesses of how the work was done and to explore how best to deliver outcomes to the farming community. The project is exploring alternative ways of doing, analysing and interpreting research rather than focussing only on the immediate results.

The group faces the problem of how to extend new knowledge and concepts to the wider farming community. Members of the various groups that are represented in the pilot group will become involved in this. The approach taken is intended to help all farmers to conduct self-initiated inquiries suited to their own enterprise (Jiggins, 1993).

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A CASE STUDY OF A SUCCESSFUL FARMER GROUP USING MEY PRINCIPLES

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SUMMARY

In early 1989 on the Liverpool Plains in Northern NSW a group of experienced farmers was assembled to attempt to increase the adoption of no-tillage sorghum production.

This district is the major production area of sorghum in NSW. It is a summer dominant rainfall area with fragile black clay soils, highly susceptible to erosion.

Research in northern NSW had demonstrated conclusively that there were major advantages in using no-tillage techniques to produce grain sorghum.

Producers had attempted these techniques but inconsistent results discouraged further adoption. The formation of a farmer group was perceived as a method of solving some of the technological problems preventing further adoption of no-tillage sorghum production.

This group was highly successful and when MEY concepts were introduced to NSW the group was further exposed to the concepts of community problem solving and learning.

The group has expanded beyond issues involved with no-tillage sorghum, to deal with all their farming and management problems.

The group is largely self-sustaining with impact from NSW Agriculture on request.

KEYWORDS

Farmer group; MEY - Most Efficient Yield.

INTRODUCTION

The Quirindi district forms the southern part of the Liverpool Plains in northern NSW. It is characterised by high quality black clay soils, annual rainfall of 600-650mm and a skilful community of farmers.

The area is a large grain producer with wheat, barley, sorghum, sunflower, cotton and maize the major crops.

Stubble mulching in strip farming rotational systems is mostly practiced, however these systems have generally been characterised by too many tillage operations. Through the wet 1980's this resulted in large losses of soil and the need for less tillage and greater retention of surface stubble became obvious. Research had shown substantial benefits in no-till crop production; particularly sorghum (Holland 1989) where the use of modern herbicides such as atrazine and glyphosate were able to be used. Through the mid 1980's growers attempted to establish grain sorghum in no-till systems but generally results were disappointing and producers quickly reverted to cultivation.